Multi-Variant Vaccine is antithetical to COVID-19 Vaccine

by Anthony of Boston

Disease is caused by bacterium, viruses, parasites or fungus. These pathogens are made up of several components, which are unique to the specific pathogen and the disease it causes. The component of the pathogen that provokes the body into producing antibodies is called an antigen. This process of which antibodies are produced in response to an antigen is a major aspect of immunity. Vaccines contain inactive parts of the antigen. When these inactive parts are introduced to the body through vaccine injection, the body responds by producing antibodies in response to it. This gives the body some protection against the disease should they be exposed to it later on. Technically, the part of the antigen presented to the body through the vaccine should not cause the disease itself. In the mRNA vaccines used for COVID-19, the part of the antigen used are the spike proteins located on the surface of the virus. However, these spike proteins are not injected into the body. Instead, the blueprint for making these spike proteins are encoded into the mRNA contained in the vaccine. Once the vaccine is injected into the body, the mRNA enters the cell where its instructions are translated into spike proteins by the ribosomes. The immune response then recognizes the spike proteins as a foreign pathogen and creates antibodies that go to the infected cell, bind to the spike proteins and mark them for destruction. Once this pathogen is removed, the antibodies remain in the body for a period of time, through which it will recognize and locate any like forms of that specific pathogen it previously destroyed. When the body is later infected by the actual virus, the antibodies will recognize the spike proteins on the surface of the virus, bind to the virus and have it removed from the body. This protection lasts for as long as the antibodies remain in the body. The COVID-19 vaccine gives about 6 months of this protection. When the virus mutates

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into a different variant, it enters the body with a different form of spike proteins unrecognizable by those same antibodies. This allows the new variant virus to evade the antibody response since those antibodies were designed to remove a specific or previous form of spike proteins(a different variant). This is when another vaccine is required for developing antibodies against that specific pathogen or variant.

Essentially with mRNA, the body is instructed to create the part of the antigen of the virus. This is in contrast to regular vaccines, where the part of the antigen comes from outside the body and is contained in the vaccine before being injected into the body. The mRNA after it has been decoded is degraded and destroyed by the body's enzymes.

When viruses themselves attack the body, the surface of the virus which contains spike proteins latches onto specific receptors of the host cell. In COVID-19, the spike proteins of the virus latches onto the host cell's ACE2 receptors before fusing with the cell membrane. This fusion allows the virus to release its genetic material into the cell. The RNA of that genetic material is then translated by the cell's cellular machinery into proteins that make up new virus particles. This is how the virus replicates.

Any long term or multi-variant solution to coronavirus will require blocking the virus's access to the cell's ACE2 receptor. This would require a vaccine that is directed against the virus's fusion proteins. Another option is blocking the ACE2 receptors altogether, but this may come with collateral effects.

Acting against virus fusion proteins would require identifying the mechanism triggered within the innate immune system upon detection of virus-cell fusion related membrane disturbances. A study found that cellular response to membrane fusion was limited to a type 1 interferon response,

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which is a major anti-viral defense important for immune activation. Type-1 interferon is essentially what provides early defense against viral activity. However, early clearance of viral activity could limit the dynamic of antigen availability and subsequent antibody response needed for the development of more circulating antibodies indicative of strong adaptive immunity. The COVID-19 vaccines limit the type 1 interferon response so that overall active immunity becomes more efficient. This helps make sense of why the vaccine is made not to prevent infection, but to prevent serious illness and death. Restricting the initial immune response or the type 1 interferon response also helps us make sense of breakthrough COVID-19 cases in fully vaccinated people.

Type 1 interferon is part of the innate immune response and also keeps the Cytomegalovirus(CMV) at bay. When type-1 interferon is suppressed, CMV can become reactivated, leading to a number of illnesses like myocarditis and Guillain Barre syndrome. This is extremely rare in most cases.. However, if researchers are going to create a multi-variant vaccine, then it will have to stimulate the type-1 interferon response at the expense of overall adaptive immunity. Such is totally antithetical to the basis of our current COVID-19 vaccine program.

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